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 AUTH.NAME AUTHOR AFFILIATION
 MORGAN,H.E. Southern California Edison Co.
 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 87-024-01:on 871109,fuel handling & containment purge
 isolation spurious actuation during vital bus transfer.
 W/8 ltr.

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Southern California Edison Company

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October 30, 1989

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U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: Docket No. 50-361
Supplemental Report
Licensee Event Report No. 87-024, Revision 1
San Onofre Nuclear Generating Station, Unit 2

Reference: Letter, H. E. Morgan (SCE) to USNRC Document Control Desk, dated
December 9, 1987.

The referenced letter provided 30-day Licensee Event Report (LER) 87-024 which addressed an event involving spurious actuation of the Fuel Handling Isolation System and the Containment Purge System. This submittal provides additional information concerning the cause of the event and corrective action. Neither the health and safety of plant personnel or the public were affected by this occurrence.

If you require any additional information, please so advise.

Sincerely,

HEMog—

Enclosure: LER No. 87-024, Revision 1

cc: C. W. Caldwell (USNRC Senior Resident Inspector, Units 1, 2 and 3)
J. B. Martin (Regional Administrator, USNRC Region V)
Institute of Nuclear Power Operations (INPO)

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LICENSEE EVENT REPORT (LER)																														
Facility Name (1) SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 2												Docket Number (2) 0 5 0 0 0 3 6 1				Page (3) 1 of 0 5														
Title (4) FUEL HANDLING AND CONTAINMENT PURGE ISOLATION SPURIOUS ACTUATION DURING VITAL BUS TRANSFER																														
EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)																				
Month	Day	Year	Year	///	Sequential	///	Revision	Month	Day	Year	Facility Names					Docket Number(s)														
1	1	0	9	8	7	8	7	---	0	2	4	---	0	1	1	0	3	0	8	9	NONE					0 5 0 0 0 1 1				
OPERATING MODE (9)			5				THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)																							
POWER LEVEL (10)		0		0		0		20.402(b)		20.405(c)		X		50.73(a)(2)(iv)		73.71(b)														
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								20.405(a)(1)(ii)		50.36(c)(2)				50.73(a)(2)(vii)		Other (Specify in														
								20.405(a)(1)(iii)		50.73(a)(2)(i)				50.73(a)(2)(viii)(A)		Abstract below and														
								20.405(a)(1)(iv)		50.73(a)(2)(ii)				50.73(a)(2)(viii)(B)		in text)														
								20.405(a)(1)(v)		50.73(a)(2)(iii)				50.73(a)(2)(x)																
LICENSEE CONTACT FOR THIS LER (12)																														
Name H. E. Morgan, Station Manager												TELEPHONE NUMBER AREA CODE 7 1 4 3 6 8 - 6 2 4 1																		
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																														
CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	/////	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	/////																			
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SUPPLEMENTAL REPORT EXPECTED (14)										Expected Submission Date (15)		Month	Day	Year																
Yes (If yes, complete EXPECTED SUBMISSION DATE) XX NO																														
ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)																														

At the time of the actuations, the Train "A" 1E 120 VAC Bus, which provides power to Train "A" of both CPIS and FHIS, was being transferred from its normal power source to its alternate power source; however, this evolution could not be demonstrated to have caused the FHIS and CPIS actuations. There have been no recurrences of radiation monitor actuations during a vital bus transfer. Re-evaluation of available information led to the conclusion that a more likely immediate cause was the reset of the Train "A" FHIS monitor which was logged as occurring 1 minute before the FHIS/CPIS actuation, but which may have actually occurred at the time of the FHIS/CPIS actuation. LER 88-012 (50-362) provides a complete discussion of the root cause and corrective actions which have since been completed, and to date, have precluded recurrence.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

SAN ONOFRE NUCLEAR GENERATION STATION UNIT 2	DOCKET NUMBER 05000361	LER NUMBER 87-024-01	PAGE 2 OF 5
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Plant: San Onofre Nuclear Generating Station (SONGS)
Unit: 2
Reactor Vendor: Combustion Engineering
Event Date: 11/9/87
Time: 1813

A. PLANT CONDITIONS AT THE TIME OF THE EVENT:

Mode: (5) Cold Shutdown

B. BACKGROUND INFORMATION:

The Fuel Handling Isolation System (FHIS) (EIIS System Code VG) consists of two independent "trains" of Fuel Handling Building (FHB) radiation monitors (EIIS Component Code RIT), associated dampers and recirculation filtration units. The Containment Purge Isolation System (CPIS) (EIIS System Code VA) is comprised of two independent trains of radiation monitors and purge isolation valves (EIIS Component Code ISV). Each train of either system is actuated by either a remote manual pushbutton or by one of the monitors sensing high radiation, instrument failure, or loss of power. Each train of FHIS and CPIS monitors share the same cabinet.

The 1E 120 VAC buses supply power to safety-related components and instruments. Each bus normally receives power from its associated 1E 125 VDC bus through an inverter. Alternately it can be powered from its associated 1E 480 VAC bus through a transformer. The 1E 120 VAC bus power is transferred between normal and alternate sources with a manual transfer switch, which is a "make-before-break" type of switch, thereby preventing, by design, any power interruption to the bus.

C. DESCRIPTION OF THE EVENT:

1. Event:

At 1813 on 11/9/87, a spurious actuation of Train "A" of both the Fuel Handling Isolation System (FHIS) and the Containment Purge Isolation System (CPIS) occurred. Operators noted a spike in indicated radiation levels on the associated monitors, with indicated radiation levels immediately returning to normal. FHIS and CPIS Train "A" were reset at 1817. All Train "A" FHIS and CPIS components functioned as designed.

At the time of the actuations, the Train "A" 1E 120 VAC Bus, which provides power to Train "A" of both CPIS and FHIS, was being transferred from its normal power source to its alternate power source. The operator who performed the transfer operation reported difficulty in moving the transfer switch.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

SAN ONOFRE NUCLEAR GENERATION STATION UNIT 2	DOCKET NUMBER 05000361	LER NUMBER 87-024-01	PAGE 3 OF 5
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2. Inoperable Structures, Systems or Components that Contributed to the Event:

None

3. Sequence of Events:

TIME	ACTION
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1813	FHIS and CPIS Train "A" actuations occurred while performing transfer of 1E 120 VAC bus "A".
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1817	After verifying the actuations were spurious, FHIS and CPIS Train "A" were reset.
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4. Method of Discovery:

Control Room indications and alarms alerted the operators of the FHIS and CPIS Train "A" actuations.

5. Personnel Actions and Analysis of Actions:

The operators responded properly to the FHIS and CPIS Train "A" actuations by verifying proper system operation and verifying that FHIS and CPIS radiation monitor instrument readings were normal prior to resetting FHIS and CPIS.

6. Safety System Responses:

All Train "A" CPIS and FHIS components functioned as designed.

D. CAUSE OF THE EVENT:

Initial Investigation:

SCE has been unable to determine the cause of the CPIS and FHIS Train "A" actuations. The following evaluations have been conducted to date:

1. Valid Actuation

A valid actuation of FHIS and CPIS has been discounted since Train "B" of either system did not actuate, and the response of the radiation monitors (an instantaneous spike in indicated radiation levels) is indicative of a spurious signal.

2. Spurious Actuation

The investigation into the cause of the spurious actuation of the FHIS and CPIS Train "A" focused on the transfer of 1E 120 VAC Bus "A", which occurred concurrently with the actuations.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

SAN ONOFRE NUCLEAR GENERATION STATION UNIT 2	DOCKET NUMBER 05000361	LER NUMBER 87-024-01	PAGE 4 OF 5
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An attempt was made to duplicate the conditions that may have caused the actuations. It was postulated that if the 1E 120 VAC bus normal and alternate source were significantly out of synchronization, the transfer operation could have caused a voltage perturbation sufficient to cause the FHIS/CPIS actuation. Transfers were performed with 1E 120 VAC Bus "A" inverter (normal source) and transformer (alternate source) synchronized, 9 degrees out of synchronization (the as-found condition), and 16 degrees out of synchronization (the worst case condition beyond which an interlock will prevent the transfer operation from occurring). Transfer switch operations for the test were performed by the same operator who transferred the bus during the event. The operator experienced the same difficulty in operating the switch during the test as was experienced during the event due to its location (6.5 feet above the floor) and the considerable force required for smooth operation. The bus transfer operations performed in the test were electrically smooth, with neither unusual alarms nor actuations occurring. Power was not interrupted to the bus during any of the transfer operations, and nothing was observed which would indicate that the inverter or transfer switch was responsible for the FHIS/CPIS actuation.

An investigation was made to identify any other activities which could have caused the actuation; no such activities were identified during the initial investigation.

Subsequent Investigation:

A subsequent evaluation of available information and data concerning this event has concluded that there is no feasible method of determining a root cause for the spurious actuation of the FHIS and CPIS. Neither is it possible to positively conclude that the FHIS and CPIS actuation was initiated by the transfer of the vital bus.

However, re-evaluation of all available information concerning the event revealed that:

1. There have been no subsequent occurrences of a FHIS or CPIS actuation, either singly or in combination, associated with a vital bus transfer.
2. The control room log records that the Train "A" FHIS monitor was reset while being restored to service at 1812, which is one minute prior to the recorded time of the CPIS and FHIS actuation. It is known that during the event, the control room operator was focusing on the vital bus transfer and may not have associated the reset of the FHIS monitor with the FHIS/CPIS actuation and that the vital bus transfer occurred after the FHIS/CPIS actuation. There are no records available at this time by which this hypothesis can be validated or refuted.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

SAN ONOFRE NUCLEAR GENERATION STATION UNIT 2	DOCKET NUMBER 05000361	LER NUMBER 87-024-01	PAGE 5 OF 5
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There have been numerous instances of CPIS and/or FHIS actuations which have been caused by high-voltage surges generated during the reset of a CPIS or FHIS monitor. The voltage surges are induced into the circuitry of the other monitor of the same train, which shares the same cabinet, causing actuation of the other monitor. Other actuations have been caused by monitor maintenance activities or operations which generate voltage surges. The most recent instance of such a spurious actuation occurred at Unit 3 on December 28, 1988 and was reported by LER 88-012 (50-362).

E. COMPLETED CORRECTIVE ACTIONS:

As most recently reported by LER 88-012 (50-362), corrective action for induced voltage surges was installation of voltage surge suppression devices on all Units 2 and 3 Engineered Safety Feature process radiation monitors. Since implementation of these corrective actions, there have been no subsequent spurious actuations due to this cause.

F. SAFETY SIGNIFICANCE OF THE EVENT:

There is no safety significance to this event as all FHIS and CPIS Train "A" components functioned as designed.

G. ADDITIONAL INFORMATION:

1. Component Failure Information:

Not applicable

2. Other LERs on Similar Events:

In LER 87-022 (Docket No. 50-361), a spurious FHIS Train A and B actuation occurred, apparently due to electrical noise. In that event, a spike was evident on one CPIS Train "A" radiation monitor, although a CPIS actuation did not occur because the CPIS Train "A" monitor was removed from service at the time.

LER 88-012 (50-362) reported a spurious Train "A" CPIS and FHIS actuation which occurred when the Train "A" FHIS monitor was reset. The FHIS reset caused the reset/test lamp to be extinguished and the lamp power supply transformer to dissipate stored magnetic energy by discharging high-voltage into the CPIS Train "A" circuitry. The CPIS Train "A" voltage surge induced a current in the FHIS circuitry by electromagnetic wave, radiative interference, causing the FHIS Train "A" actuation relay to trigger. Corrective actions have been completed as discussed in the above paragraph E, "Corrective Actions."